# Learning Designs Supporting Localisation for Personalised and Adaptive E-Learning

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**Abstract.** Localisation is a process through which an e-learning product is transformed to serve the primary needs and characteristic of a specific market. The aim of the localisation is far beyond translating the product to a new language. It is not only to translate the content but also to adapt it to the culture in concern as well. This article introduces the property of learning designs in iClass supporting localisation.

## 1 Introduction

iClass (Intelligent Distributed Cognitive-based Open Learning System for Schools), an education project of European 6th Framework Programme, has objectives of formulating a pedagogical approach supporting a personalised, flexible and learner-centred learning experience using ICT.

In order to have the content personalised to a specific user, the first step is to localise the content. Localisation is a process through which an e-learning product is transformed to serve the primary needs, such as language (accent), cultural factors and etc., and characteristic of a specific market [1].The aim of the localisation is far beyond than translating the product to a new language. It is not only to translate the content but also to adapt it to the culture in concern as well.

Developing learning designs that include conditions and rules to play content localised according to the needs and characteristics of a user is not economical because each learning design should contain all possible content instances localised to a language or a culture. For this reason iClass is mainly focused on the developing process of the content used in learning designs supporting localisation. In order to achieve this, iClass try to develop an object oriented based content development and tag each content with suitable data to enable the system to choose the right content at the right time. Since the pilot will take place in four countries, this content development process is outlined to enable economical production of localised content for a number of markets.

This article introduces the property of learning designs in iClass supporting localisation.

## 2 Content Data Hierarchy

The iClass content can be categorised into four levels. These are:

- the common practice activity structures,
- the activities that constitute these activity structures,
- the iClass Learning Objects and
- the Sharable Content Objects.

Common practice activity structures are stored as learning designs conforming to the IMS Learning Design (LD) Level - B specification. These activity structures can vary in their execution, with respect to the learner profiles.

Activities are elements of activity structures. Each activity suits one Learning Event type using 8 Learning Event Model introduced by LabSET [7]. Currently, each activity is matched with one iLO (iClass Learning Object). These iLOs represent the aggregation of the most granular units of content that are the SCO's (Sharable Content Objects). SCO's represent the most granular units of content to be developed within the scope of iClass. Each SCO comprises a set of assets.

The levels of the content data hierarchy of iClass are given in the Figure 1 [4].

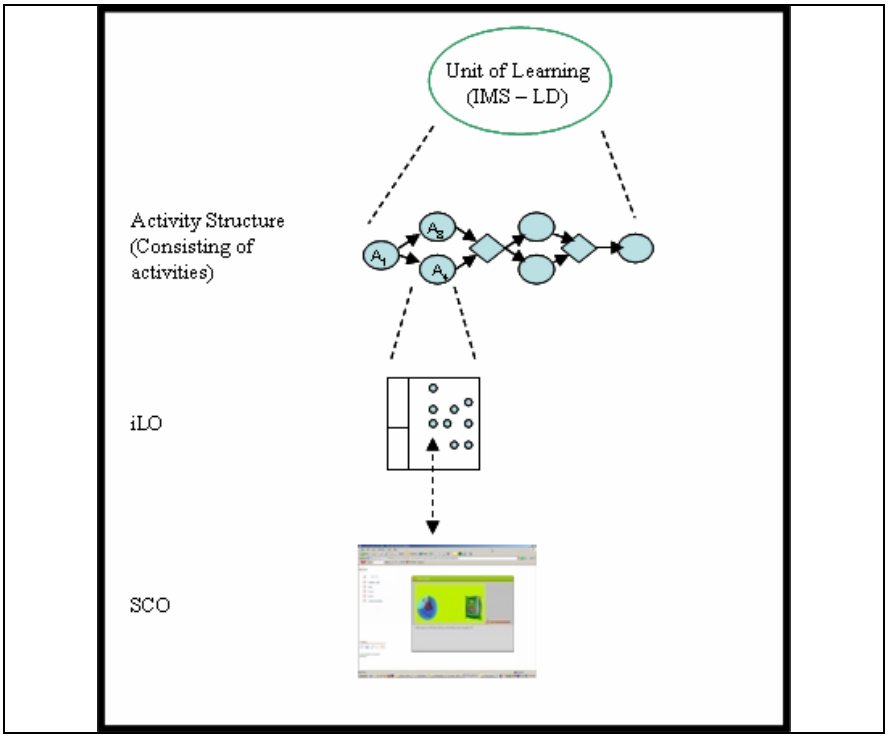


**Fig. 1.** iClass content data hierarchy

## 3 Object Oriented Based Content Development

As it is stated in the section 1, in order to develop content supporting localisation, iClass try to apply an object oriented based content development. A graphical explanation of this object oriented based content development used in iClass is given in Figure 2.

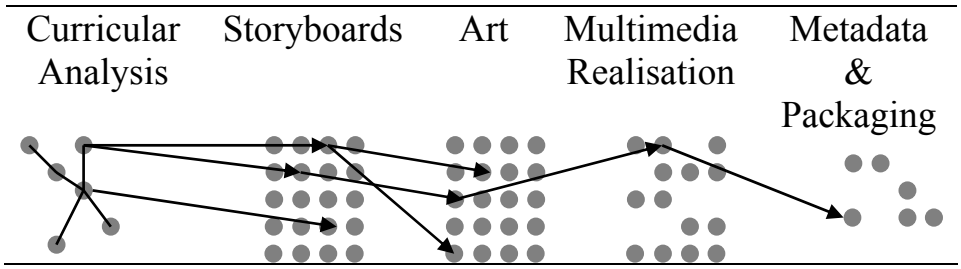


**Fig. 2.** iClass object oriented based content development model

The output of the curricular analysis step is a map of objectives and expected outcomes extracted from the curriculum [6]. The realisation of these objectives is achieved at the storyboarding step, which means each storyboard is developed and matched with an objective. After developing storyboards, assets related with each storyboard is created and by using these assets multimedia content is developed. At the end, the content is packed by adding metadata and the content organisation.

Showing the relations between the steps through this object oriented developing process will provide traceability of components. Content pieces that need to be localised can be traced back to their origins, which means localisation may occur at any of the levels above either at the asset level or at the objective level.

## 4 Content Tagging

As it was stated in the section 1, content is tagged with suitable data to enable the system to choose the right content at the right time, which means that the elements of four-levels described in Section 2 are tagged with an appropriate metadata set.

CELEBRATE project extended the Learning Object Metadata (LOM) schema developed by the IEEE Learning Technology Standards Committee [5] by defining new elements and new vocabularies for CELEBRATE project.

New elements are ‘Learning Principles’ in ‘Educational’ category and ‘CELEBRATE Digital Rights’ in ‘Rights’ category. New vocabularies have been defined for ‘Learning Resource Type’, ‘Intended End User Role’ and ‘Context’ in ‘Educational’ category and some refinements has been made to ‘Language’ value space and ‘Typical Age Range’ value space [2]. iClass further extends this schema as described in the following paragraphs.

In order to tag the content, two types of parameters, namely contextual and pedagogical parameters are used. These parameters are used to match the content with

the user's preferences [3]. Contextual parameters include "Intention", "Depth of Coverage", "Duration" and learner's prior knowledge. Sample vocabularies for these parameters are given in Table 1.

**Table 1.** Sample vocabularies for contextual parameters

| Contextual Parameters | Vocabulary |
|---|---|
| Intention | "Introduction", "Revision", "Exam Preparation", "Enrichment", "Remedial" |
| Depth of Coverage | "To teach core skills of the domain", "To teach all skills of the domain", "To teach a specific skill in the domain" |
| Duration | "Short", "About an hour", "Leisurely" |
| Learner's prior knowledge | Skills determined for the domain. |
| Place | "In School", "Out of School" |
| Degree of collaboration | "Alone", "As a pair of students", "With a group of students", "With the assistance of teacher", "With the assistance of parents" |
| Environment | Own PC", "Lab PC", "Network PC", "Handheld", "Laptop", "Projector" |
| Culture | "UK", "TR", "FR", etc. |

Pedagogical parameters include "Curriculum", "Highlighting cross-curricular connections", "Learning sensory bias", "Narrative Preference", "Learning Bias", "Learning Event Bias", "Navigational Preference", and "Contextual Preference". Sample vocabularies for these parameters are given in Table 2.

## 5 Selecting Suitable Content

In order to capture the learner's and the teacher's preferences, iClass employs two preferences tools, namely teacher's preferences tools and student's preferences tools. According to the preferences captured, iClass system first selects an appropriate Unit of Learning in a given domain. An LD covering this Unit of Learning is selected by the user from among the domain whose ontological maps have been prepared. By comparing the metadata of the activities and the iLOs, system matches suitable iLOs which consists of one or more SCO(s) for each activity. Each SCO is responsible in supporting localisation.

**Table 2.** Vocabularies for pedagogical parameters

| *Pedagogical Parameters* | *Vocabulary* |
|---|---|
| Curriculum | "UK", "TR", "FR", etc. |
| Highlighting cross-curricular connections | "Yes", "No" |
| Learning sensory bias | "Visual", "Auditory", "Kinaesthetic", "None" |
| Narrative Preference | "Start with concrete examples", "Start with the theories", "No preference" |
| Learning Bias | "Yes", "No" |
| Serialist vs. Holist | "0", "1", "2" |
| Practical vs. Theoretical | "0", "1", "2" |
| Participatory vs. Observational | "0", "1", "2" |
| Learning Event Bias [7] | • Receive: Number of times a Reception event is covered<br>• Imitate: Number of times an Imitation event is covered<br>• Practice: Number of times a Practicing event is covered<br>• Explore: Number of times an Exploring event is covered<br>• Creates: Number of times a Creation event is covered<br>• Experiment: Number of times an Experimenting event is covered<br>• Debate: Number of times a Debating event is covered |
| Curriculum | "UK", "TR", "FR", etc. |

## 6 SCOs Supporting Localisation

Although at the first release iClass supports some simple localisation features, it supports localisation both in terms of language and culture. Figure 3 represents some properties of an iClass SCO. The "lang" node represents the language of the content which will be used to select the language of the animation slider given in the Figure 4.

```
- <sco>
    <name>sco094f12cf-f125-40ef-83a4-a62abe883b3d</name>
    <type>receive_1</type>
    <lang>FRFR</lang>
```

**Fig.3.** Some nodes from "sco_info.xml" used in iClass

According to the information in the “lang” node of the “sco_info.xml”, content renders the over mode of the animation slider Play/Pause button at the run-time using information set in the “localisation.xml” file.

```
- <slider>
    <lang id="UKEN" play="Play" pause="Pause" restart="Restart" />
    <lang id="FRFR" play="Jouer" pause="Pause" restart="Recommencer" />
  </slider>
```

**Fig.4.** Some nodes from “localisation.xml” used in iClass

Some other information such as the title of the SCO and screen text is translated during the development stage. Also information related to the culture, such as the name of a café, is localised and implemented during the development stage as given in the Figure 5.


**Fig.5.** A sample SCO localised into two different cultures

In iClass localisation is not just translating the name of the café but also changing the main objects of the content, such as the character used in the animation, as shown in Figure 6.

## 7 Conclusion

This paper introduces the property of learning designs in iClass supporting localisation. Although the first version of iClass supports simple localisation features, the further studies will improve the features supported. Assigning localisation features for other levels in the iClass content data hierarchy, will improve the flexibility and adaptivity of the iClass systems in terms of localisation.

Other challenge in iClass in terms of localisation for further releases is to improve the system so that content is totally run-time localised.

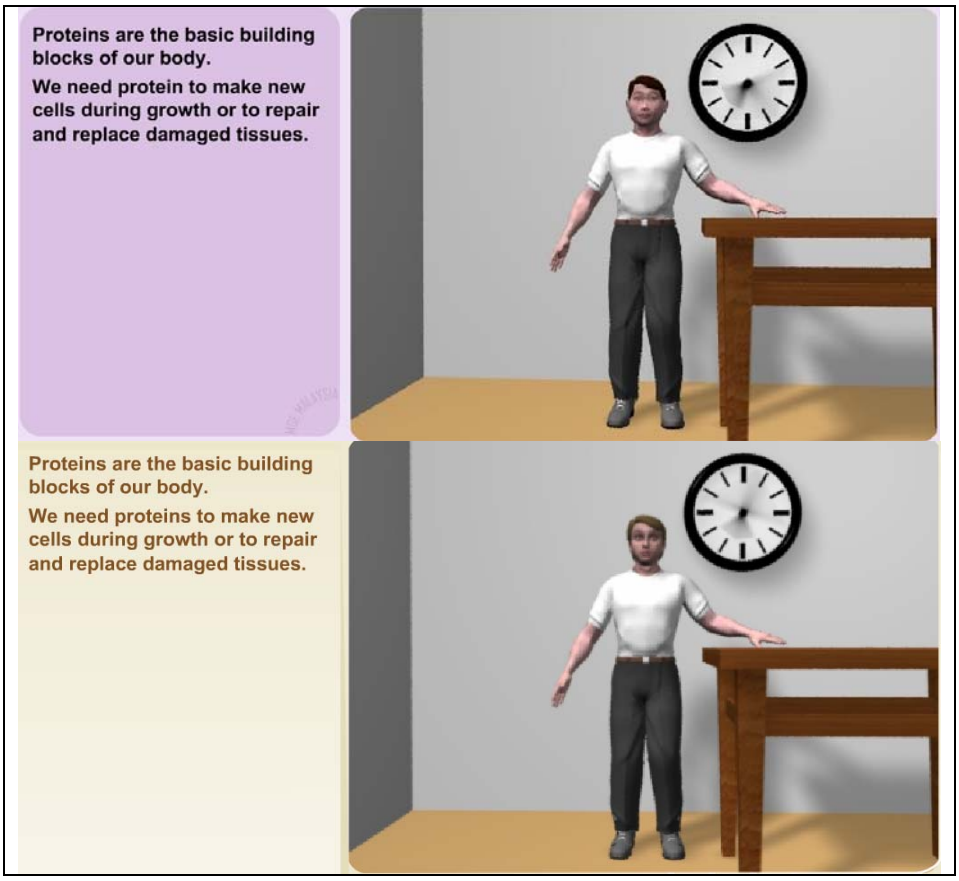


**Fig.6.** A sample SCO localised into two different cultures

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## References

1. Clark D., (2005), Localisation of e-learning, EPIC Group.
2. Celebrate Project Website, http://www.eun.org/eun.org2/eun/en/index_celebrate.cfm, Accessed 04.01.2005.
3. iClass, (2005), Models Enabling Individualization in iClass Version <1.1>, iClass Consortium WP4 project team.

4. iClass , (2005), Project Content Structuring Report Version <0.7> Draft, iClass Consortium Subproject 4 team.
5. IEEE Website, http://www.ieee.org/portal/site, Accessed 04.01.2005.
6. Küçüktunca M., Altuner E.M., Çakıroğlu E., (2005), Reflecting Curricular Expectations into Development of Content, *V. International Educational Technologies Conference*, Sakarya, Turkey.
7. Leclercq D. & Poumay M., (2004), The Learning Events Model (LEM): an overview, (Excerpt from Leclercq, D. and Poumay, M. (2004 – to be published), The Learning Events Model – Instructional design, from events of learning to activities and curricula) LabSET-University of Liège, Belgium.
8. Türker A., Görgün İ., Conlan O., (2006), "The Challenge of Content Creation to facilitate Personalized eLearning Experiences", International Journal on E-Learning, Volume 5, Number 1, pp 1-17.